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Proximal Deictic Temporal Reference with Calendar Units^{*}

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The talk centres on deictic reference to temporal segments of the near future or past using of the fundamental calendar units (days, years, weeks, months) and their divisions (days of the week, parts of the day).

- **The global aim of the study:** to identify language specific and cross linguistic patterns in the linguistic use of calendar units.
- **A more specific goal:** determining to what extent temporal reference can be achieved through linguistic calendar expressions independently of other elements—how much of the necessary information is directly encoded in them and how much is supplied by additional linguistic and extra-linguistic elements.

Today's talk presents initial results of ongoing research. We will consider here some of the properties of three types of expressions employing linguistic calendar terms: the fundamental units (day, year, week, month), parts of the day and the (named) days of the week. The fundamental units have been examined (to varying degrees of depth) in some 20 languages of various language families. The other units have only been examined in a more limited set of languages, at this stage.

As will be shown, the three types of expressions reflect temporal reference to different levels or different cycles and their linguistic behaviour reveals differences in the temporal information they encode and in their ability to function independently as temporal markers.

1. The Fundamental units

The principal of a calendar is the division of the abstract / metaphorical image of time into more or less identical segments so that every punctual event can be assigned to a unique segment.

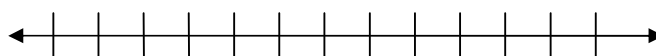


Fig. 1

Formally, temporal identification of a segment is determined by three components: the name of the temporal unit, the orientation (+, -) and the sequential number of the unit, starting with the deictic anchor.

^{*} We would like to extend our thanks to all our colleagues, friends and informants who supplied us with data and judgements on their own languages.

← −						→ +				
N	...	3	2	1	S	1	2	3	...	n

Fig. 2

Linguistically, the segment that contains S, the time of speech, functions as the deictic anchor whichever the size of the unit selected. In many languages, reference to Day S is lexicalised, and reference to larger units is formed of the unit modified by a determiner or demonstrative. This type of modification can produce a complex or lexicalised expression, depending on properties of the specific language.

Table 1: Expressions referring to the current S anchor of the various units

	French	English	Estonian	Hebrew
Day	<i>aujourd'hui</i>	<i>today</i>	<i>tāna</i>	<i>ha.yom</i>
Year	<i>cette année (ci)</i>	<i>this year</i>	<i>see aasta</i>	<i>ha.šana</i>
Month	<i>ce mois (ci)</i>	<i>this month</i>	<i>see kuul</i>	<i>ha.xodeš</i>
Week	<i>cette semaine (?ci)</i>	<i>this week</i>	<i>see nādal</i>	<i>ha.šavua</i>

The formal three-part process of identification seems to be in operation from a certain number of units (e.g., 2 and higher, depending on granularity and language). However, this method is not employed for more proximal units ($\pm[1-3]$, depending on language), where this system is frequently replaced by lexicalised or frozen constructions that do not provide these components as independent information.¹ These frozen expressions enable the identification of the intended temporal reference regardless of the linguistic context (such as verbal time reference).

Table 2.1: Expressions referring to the proximal sequence of days²

	French	English	Hebrew
D+n	<i>dans n jours</i>	<i>in n days</i>	<i>od n yamim</i>
D+3	<i>après-après-demain</i>	<i>in 3 days</i>	<i>od 3 yamim</i>
D+2	<i>après-demain</i>	<i>the day after tomorrow</i>	<i>maxratayim</i>
D+1	<i>demain</i>	<i>tomorrow</i>	<i>maxar</i>
D0	<i>aujourd'hui</i>	<i>today</i>	<i>ha.yom</i>
D-1	<i>hier</i>	<i>yesterday</i>	<i>etmol</i>
D-2	<i>avant-hier</i>	<i>the day before yesterday</i>	<i>šilšom</i>
D-3	<i>avant-avant-hier</i>	<i>3 days ago</i>	<i>lifney 3 yamim</i>
D-n	<i>il y a n jours</i>	<i>n days ago</i>	<i>lifney n yamim</i>

¹ By 'frozen expression', we refer to expressions such as *last year*, *the day before yesterday*, which are phrasal and cannot be referred to as lexicalised, but whose use for a specific temporal reference is standardised (cf., with the non-frozen *two days before yesterday*).

² In all these languages, a numbered construction is possible for D+/-2. Hebrew uses a dual plural of `day` in this case *lifney/od yomayim*.

Table 2.2: Expressions referring to the proximal sequence of days

	Estonian	Polish	Malgasy
D+n	<i>n päeva pärast</i>	<i>za n dni</i>	<i>afaka (n-1) andro</i>
D+3	<i>üle-ülehomme</i>	<i>popojutrze</i>	<i>afaka 2 andro</i>
D+2	<i>ülehomme</i>	<i>pojutrze</i>	<i>raha afaka rahampitso</i>
D+1	<i>homme</i>	<i>jutro</i>	<i>rahampitso</i>
D0	<i>täna</i>	<i>dzisiaj</i>	<i>androany</i>
D-1	<i>eile</i>	<i>wczorai</i>	<i>omaly</i>
D-2	<i>üleeile</i>	<i>przedwczoraj</i>	<i>1 andro lasa</i>
D-3	<i>üle-üleeile</i>	<i>przed-przedwcoraj</i>	<i>2 andro lasa</i>
D-n	<i>n päeva tagasi</i>	<i>n dni temu</i>	<i>-(n-1) andro lasa</i>

The languages examined demonstrate a correlation between the diachronic process of freezing, whether to a level of lexicalization or to a larger unit, and the level of temporal proximity to the present anchor. The more lexicalised forms, most typically DAY S and its immediate +/-1 neighbours, are least transparent in the identification of the temporal reference.

Based on the languages examined, we propose that the anchor of the present (S) conceptually determines 3 zones in the temporal domain - the present, the proximal and the distant - extending both to the future and the past - and separated by a fuzzy boundary.

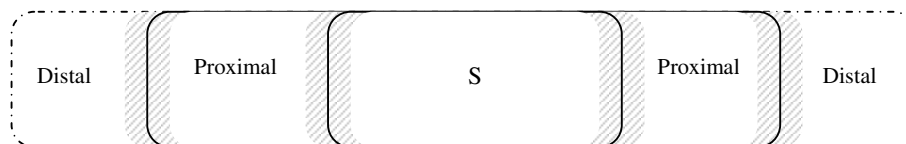


Fig. 3: Zones of deictic temporal expression

Linguistic reference to the distal zone employs the regular rules of sequential reference (e.g., D+/-n in table 2), while reference to the proximal zone employs specialised constructions.

The languages examined reveal that the three zones vary in size and are not necessarily symmetrical in the present/past orientation. Numbered structures are always possible ≥ 3 , while lexicalisation is typically limited to the 0-1 range. The components needed for temporal reference are more transparent and compositional, while the inner zones use frozen expressions that are more opaque in this respect.

The effect of the type of unit is evident here - 'DAY' being the primary unit, which most frequently takes the most frozen, lexicalised forms, that are least transparent.

The size of the intersection (and overlap) between the numbered and non-numbered forms varies from language to language, but also among speakers.

The distributional properties of these expressions in a number of languages examined indicate a nominal categorisation, although their functions in the clause may be adverbial (as evident in their traditional categorisation in some languages).³ Consequently, we consider them nominal and referential expressions on par with other nominal forms.

Consequently, the zoning pattern can be correlated with the scale of referential activation/ givenness/ accessibility that is associated with referring expressions in pragmatic theory (cf., Ariel 1990; Gundel, Hedberg & Zacharski 1993).⁴ Accordingly, more opaque (more central) forms refer to more activated, relatively accessible referents in the addressee's mind, while the very transparent numbered structures refer to temporal referents of low accessibility. Thus, the proximal and central DAY units are also the highest in accessibility among these forms.

2. The Parts of Day

The parts of the day are a decomposition of time which is not in a part-whole relation with the fundamental units of the calendar which it supposedly partitions; that is, the partition is composed of different recurring segments: (Fr. *matin, midi, après-midi, soir, nuit*; Eng. *morning, noon, afternoon, evening, night*). Parts of day can be used to refer to two series – either by type (*this morning* vs. other mornings) or by DAY (*this morning* vs. *this afternoon*). The different segments are sequential, but the boundaries between them remain vague and may vary with each token. Consequently, the same point in time can belong to different segments, even within the same discourse, as illustrated in (1).

- (1) [...] depuis le mardi dès le soleil couché fixé à cinq heures du soir, relativement au règlement des eaux du 22 juin 1748, jusque au mercredi **à deux heures après midi** et depuis le samedi à onze heures du matin jusqu'au dimanche **à deux heures du soir**, ce qui compose 48 heures dans chaque semaine pour servir depuis le 1^{er} mars jusques après le détritage des olives du moulin du dit Cirlot et de la Communauté.

(http://www.pays-du-var-est.eu/le_ray-23.htm)

The parts of day are also referred to by lexicalised and frozen expressions as well, although not necessarily parallel to those used for the fundamental units (**last/next morning* vs. *last night / *next night*; **matin dernier/prochain* vs. *la nuit*

³ The categorial classification of these expressions may vary in different languages. In the set of languages examined these expressions appear with linguistic markers that indicate a nominal nature (plurality, gender, case, demonstratives, definite determiners, quantification, prepositions). Thus, the calendar unit heads a nominal phrase, whatever the function of this phrase in the clause.

Marc Wilmet (2003: pp 467) classifies such expressions in French as temporal indefinite pronouns.

⁴ Functional pragmatic theories of referential expressions argue that the form of referring expressions linguistically encode or signal the discourse functions / cognitive statuses that the intended referent is assumed to have in the mind of the addressee, thereby constraining possible interpretations. (e.g., pronouns are 'active' in Chafe 1976, 'highly accessible' in Ariel 1990; 'in focus' in Gundel, Hedberg and Zacharski 1993, while new referents are 'inactive', low accessible' and 'type identifiable' respectively).

dernière/prochaine). These units also display differences with respect to the three proximity zones. In contrast to the fundamental units, these linguistic expressions cannot provide independent temporal identification and require additional linguistic cues, through the verb or other means, to identify the intended segment. Thus, *cet après-midi* can refer to a present, past or future orientation, although being a part of the present day.

- (2)a. Cet après-midi, j'irai chercher Claire à la sortie de l'école. (S=10:00)
 b. Cet après-midi, nous travaillons sur les calendriers. (S=15:15, 18h15)
 c. Cet après-midi, nous avons eu des exposés très intéressants. (S=21:00)

This lack of independence is particularly evident with respect to the day and night division. Words referring to day and night refer to an alternation which does not correspond to calendrical dates, but is the mundane division in which night overlaps the calendrical day. A calendrical day includes two successive but disjoint night segments. In some of the languages examined (Fr., Eng., Heb.,) the relevant linguistic expressions (e.g., *tonight*, *cette nuit*) cannot independently refer to these segments, leading to potential ambiguity. Thus, *ce matin* / *this morning* refers to the morning of the current day while *cette nuit* / *tonight* refers to one of two nights that are part of the current day. Within a specific utterance, the intended reference is generally non-ambiguous, thanks to the verbal cues that the missing orientation is (affected also by the exact place of S within the Day0 anchor).

Table 3: Expressions referring to proximal nights (French, English, Taiwanese)

-2		1		0		+1		+2	
	D	N-2,-1	D	N-1,0	S	N0,1	D	N1,2	D
		<i>la nuit dernière</i>		<i>cette nuit</i> <i>la nuit dernière</i>		<i>cette nuit</i> <i>la nuit prochaine</i>		<i>la nuit prochaine</i>	
		<i>*yesterday night</i> <i>last night</i>		<i>?tonight</i> <i>last night</i>		<i>tonight</i> <i>*next night</i>		<i>tomorrow night</i> <i>*next night</i>	
				<i>tsaham</i>		<i>amsi</i>		<i>miamiamsi</i>	

3. Days of the Week

The third type of expression, the names of week days, is an aggregation of consecutive occurrences. Formally, the names of days (e.g., *Friday*, *vendredi*) define a disjoint sequence, each element of which is associated with a unique occurrence within the unit of the next granularity, the week.

The part-whole relation between a day and a week is a complete calendar part-whole relation, but linguistically, this relation is less evident. This is exemplified in temporal reference with unmodified names of days in French. identifies the nearest occurrence of the day relative to S (except for Day S itself), but orientation is necessarily provided by the verbal temporal reference as it is with the parts of the day.

S in Monday0: **lundi*; *mardi* = mardi0 or mardi-1; *jeudi* = jeudi0 or jeudi-1.

The same effect is evident with days of the week introduced by a demonstrative. Thus, the temporal identification of *ce jeudi* depends on the proximity of Day 0 rather than on its inclusion in Week 0.

This is not the case for the expressions that mark lower proximity, specifically days of the week modified by *dernier / prochain*. These expressions explicitly encode the orientation of reference and the lower proximity, the exact identification of the intended temporal referent is still unclear. The data provided by our informants suggest that these constructions are underspecified as to whether the intended reference is the nearest occurrence or the second in the sequence. Although the resulting ambiguity is affected by the relative proximity of Day S, it is not resolved in specific occurrences.

This ambiguity and the effect of the proximity of Day S are reflected in the judgements shown below (collected from a homogenous group of over 10 people): (Parallel results were obtained with a past orientation).

S on Monday0,

mardi prochain refers to mardi+1 for all informants;

mercredi prochain refers to mercredi+1 for some 75% of the group;

jeudi prochain is considered ambiguous by 50%;

vendredi prochain refers to vendredi0 for some 75% of the group.

S on Friday0,

jeudi dernier refers to jeudi-2 for all informants;

mercredi dernier refers to mercredi-2 for some 75% of the group;

mardi dernier is considered ambiguous by 50%;

lundi dernier refers to lundi0 for some 75% of the group.

4. Typological indexing from a theoretical point of view:

Cognitive Spatialisation of Time :

Temporal expressions in language frequently employ terms that encode a spatial orientation along one dimension inside of the three-dimensional universe : vertical, horizontal, depth.

horizontal : e.g. Romance languages

vertical: e.g. Chinese, but also found in some expressions in European languages (*sous huitaine, sous huit jours, under a week*)

depth: So far not found basic units that employ depth spatialisation, but it is found for more extensive segments (e.g., *the depth of winter*).

mixed: e.g. Malgasy (Malgache) : horizontal past, vertical future

Stages in the Knowledge of Numeration (in Western culture)

Before the XVII^e century: arithmetic versus geometry (Euclid, Aristotle):

- numbers versus magnitudes:⁵ discrete entities versus mass entities.

⁵ According to Pascal and Barrow, Newton (1707), $\sqrt{2}$ can be understood only as a geometric magnitude.

- 1 is the generator of all numbers, which means multiplicity of the unit of one kind (5 horses, 5 tables, indicate “five occurrences of the unit horse, table). So, 1 acts as a classifier, but it is not a number in itself.⁶

By 1500, zero becomes a number.

- The point generates the line (by a movement)
 - *the line is part of geometry*
 - *calendar units can be numbered from 2*

Theoretically, reference points along the lines can be expressed in the following ways:

- using numbers starting with 2 (line 1 in the table below)
- Use of frozen or lexicalised expressions that indicate the alternation of reference by single steps without the use of numbers (line 2).

Table 4.1

orientation (backwards): ←					orientation (forwards) : →				
nU-	...	3U-	2U-	U-	S	U+	2U+	3U+	nU
	...	U---	U--	U-	S	U+	U++	U+++	

How are the latter theoretical options realised in language?

- S, U+ and U- are expressed as lexicalized (**U-**) and (**U+**) or as modified (U)- and (U)+.
(**U-**) Fr. *hier*; (**U+**) Persian *farda*; (**U-**) *année dernière*; (**U+**) *année prochaine*
- U++ and U-- can be realized as a modified form (**U+**)+ or as a different lexicalised form (**U++**) or **U(++)**.
(**U+**)+ Fr. *après-demain*;
(**U++**) *maxratayim* (Heb. 'day after tomorrow', a dual plural lexicalisation of 'tomorrow').
(**U--**) *šilšom* (Heb. 'day before yesterday', non-transparent lexicalisation)
- U+++ can be realized as a reduplicated modification ((**U+**)+)+, as a simple duplication (**U++**)+, (**U+**)+ or with a new modifier (**U+++**).
(((**U+**)+)+) Fr. *après-après-demain*;
((**U+**)+)+ Persian *passimfarda*;
((**U++**)+ None found in our data;
(**U+++**) None found in our data.

Note that the modifiers used in (**U-**)- and (**U+**)+ constructions enable productive recursion, which is attested, although the frequency is reduced with the increase in number of recursions. This is illustrated in (3), showing a x5 recursion of the modifier ((((((U-)-)-)-)-)-)-).

(3) **GODOT**: Avant-avant-avant-avant-avant-hier, je passe au loin devant un arbre et une route de campagne. (Tribute to Beckett's *En attendant Godot*;
http://desencyclopedia.wikia.com/wiki/En_attendant_Godot)

⁶ Except for the Pythagoreans.

In some languages, the recursive pattern is preferred in the spoken language (e.g., Moldavian/Romanian), while in other languages, although frozen forms of the recursive pattern exist for the mid-range proximity (+/-2-3 and rarely for higher), these forms appear to be used less in present day, and speakers show a preference for the compositional enumerated structures that are the only option from more distal reference (e.g., Estonian, Hebrew, Persian (in which the enumerated form was apparently borrowed from Arabic)).

After the XVII century (Stevin, Wallis, ...)

- step 1 : Magnitudes can be handled as numbers
- step 2 : Magnitudes are numbers
- 1 is a number
- 0 is the natural correspondent of the point
 - 0 is the generator of numbers
 - the line is in correspondence with the set of all “real” numbers

Table 4.2

orientation (backwards):-←						orientation (forwards) : +→				
nU-	...	3U-	2U-	U-	S	U+	2U+	3U+	...	nU
	...	U---	U--	U-	S	U+	U++	U+++	...	
nS,-	...	3S,-	2S,-	1S,-	0S	1S,+	2S,+	3S,+	...	nS,+

The options in the last line are found in anaphoric temporal reference rather than in deictic, eg. *un jour avant* vs *la veille*.

Knowledge About Sequences/Orders

Expressions that involve non-lexicalised forms, employ modification, frequently using ordinal adjectives (*last, dernier*), sequential relational adjectives (*next, prochain*), or numerals (cardinal or ordinal).

The use of cardinals in place of ordinals is frequent (*le 2 du mois, 12 du mois de mars*), but this is not unique for temporal expressions, and is common in numbered sequences in general (e.g., *Louis XIV* rather than **Louis le 14ème*).

6. Summary:

This study clearly indicates that deictic temporal reference is far from a simple task, and requires not only knowledge of the appropriate frozen expressions, but also reference to other linguistic and extra-linguistic factors, and even then, the identification of the intended reference may not be absolutely clear.

Several patterns have been highlighted in this talk:

- **Relation to abstract calendars** - Different types of linguistic calendar expressions show different relations with the concepts and segmentations of the abstract calendar. This is particularly evident with proximal reference using days of the week, that shows sensitivity to DAY S, but not the containing segment WEEK S. This highlights the fact that linguistic encoding of time is more complex and one cannot assume simple direct reference to abstract calendar systems.
- **Distance** - The temporal domain can be divided into 3 (overlapping or vaguely bounded) zones around the anchor of the present (S), which extend both to the future and the past. Reference to the central and proximal zones uses specialised constructions, while distal reference employs (numbered) sequential constructions.
- **Transparency** - Formally, temporal identification requires three components: unit size, orientation and distance from the central anchor. In language, constructions that refer to distal units ($\geq \pm 3$ depending on language) are typically compositionally transparent in this way, but constructions indicating more proximal reference, particularly the 0, ± 1 range, these components may be more opaque or lack altogether.
- **Referential (In)dependence** - Some temporal expressions (most notably reference with the fundamental units) can identify the intended temporal referent on their own, while others cannot function independently and require temporal cues from the rest of the clause (e.g., parts of the day) or extra-linguistic information (like the identity of DAY S for the use of days of the week). Interestingly, even this extra information cannot guarantee accurate identification of the intended time.

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